

Name VBY

Block _____

REVIEWING AND PREPARING FOR THE ALGEBRA 2B FINAL EXAM

- The test is worth 20% of your grade for this trimester!
- You may prepare one 8.5x11 sheet of paper as a "cheat sheet" for the test. It must have your name on it in ink. You may not use some else's card or give yours away.
- The test is not short (67 questions)! In order to have enough time to finish, you will have to be prepared and know how to approach each problem.
- The best way to prepare for the test is to review, fix, and rework your old unit tests, and to complete your reviews.

FINAL EXAM REVIEW – PRACTICE PROBLEMS

When you complete each chunk of problems, be sure to rate your current understanding by circling the proper number!

1 2 3 4 5

1=perfect!

3= so-so

5= definitely need to re-learn this for the test!

EXPONENTIAL and LOGARITHMIC FUNCTIONS

1. An exponential function takes the form $f(x) = a \cdot b^x$, where a represents initial amount and b represents growth/decay factor.

2. If $b > 1$, the function is classified as exponential growth and if $0 < b < 1$, the function is classified as exponential decay.

Vocab/Basics 1

2

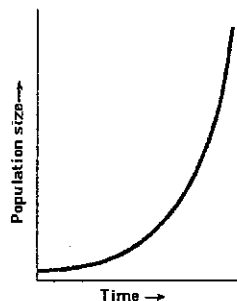
3

4

5

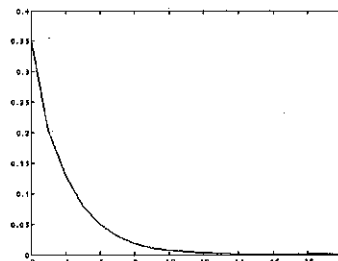
Are the following exponential growth or decay?

3.



growth

4.



decay

-1	27
0	9
1	3

5.

decay

6. $y = -\frac{1}{3}(4)^x$

growth
4 > 1

7. $y = 60(.4)^x$

decay $0.4 < 1$

Growth or Decay 1 2 3 4 5

Write the equation of the exponential function that models each situation.

8. A scientist starts with 150 bacteria that double in population every three days. Write an equation $b(d)$ to model the number of bacteria, b , after d days.

$$b(d) = 150(2)^{d/3}$$

9. I have \$2500 in a mutual fund that earns 7% every three months.

$$b = 100\% + 7\% = 107\% \Rightarrow 1.07 \quad f(t) = 2500(1.07)^{t/3}$$

10. After the zombie antidote comes out, the 10,000 zombies begin to die out at a rate of 12% each day.

$$b = 100\% - 12\% = 88\% \Rightarrow 0.88 \quad z(d) = 10,000(0.88)^d$$

11. I have 80 gummy bears and every time I go to the cupboard I eat half of the gummies.

$$g(t) = 80(0.5)^t$$

Modeling 1 2 3 4 5

Find x .

12. $8^{3x-5} = 8^4$

$$3x-5=4$$

$$3x=9$$

$$x=3$$

13. $2^{6x-2} = 1 = 2^0$

$$6x-2=0$$

$$\frac{6x}{6} = \frac{2}{6}$$

$$x = \frac{2}{6} = \frac{1}{3}$$

14. $5^{-2x+1} = 125 = 5^3$

$$-2x+1=3$$

$$-2x=2$$

$$x=-1$$

Solve Exp Eq. 1 2 3 4 5

15. Rewrite the following logarithms in exponential form:

a. $\log_3 81 = 4$

$$3^4 = 81$$

b. $\log_4 \frac{1}{16} = -2$

$$4^{-2} = \frac{1}{16}$$

c. $\log 100 = 2$

$$10^2 = 100$$

d. $\ln 15 = x$

$$e^x = 15$$

16. Rewrite the following exponentials in logarithmic form:

a. $5^4 = 625$

$$\log_5 625 = 4$$

b. $3^x = 729$

$$\log_3 729 = x$$

c. $e^x = 10$

$$\ln 10 = x$$

17. Evaluate the following:

a. $\log_2 32 = x$

$$2^x = 32 \quad x=5$$

b. $\ln e^{12}$

$$12$$

c. $e^{\ln x}$

$$x$$

18. Solve the following:

a. $\log_7 x = 5$

$$7^5 = x$$

$$x = 16,807$$

b. $\log_{30} 10 + \log_{30} x = 5$

$$\log_{30} 10x = 5$$

$$30^5 = 10x$$

Logarithms 1 2 3 4 5

Overall rating for exponential and log functions

1 2 3 4 5

$$\frac{24,300,000}{10} = \frac{10x}{10}$$

$$x = 2,430,000$$

QUADRATIC FUNCTIONS

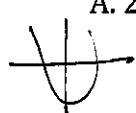
1. The shape a quadratic function makes is a parabola. The maximum or minimum point of a quadratic function is called the vertex.

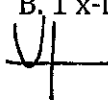
2. What does a solution/root/zero look like on a graph? x-intercept


3. The formula to find the axis of symmetry is $x = \frac{-b}{2a}$ (from standard form)

4. The quadratic formula is $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$. It finds the solutions.

5. Tell whether the discriminant, $b^2 - 4ac$, must be greater than, less than, or equal to 0 to make each of the conditions true:

A. 2 x-intercepts
 $b^2 - 4ac > 0$

B. 1 x-intercept
 $b^2 - 4ac = 0$

C. no x-intercepts  $b^2 - 4ac < 0$

Basics 1 2 3 4 5

6. The height, d , of an object after t seconds is modeled by the equation $d = -16t^2 + 3500$. Find the height of the object after 3 seconds. $d(3) = -16(3)^2 + 3500$

7. Find the vertex of $y = -3x^2 + 12x - 8$. $x = \frac{-b}{2a} = \frac{-12}{2(-3)} = \frac{-12}{-6} = 2$ $f(2) = -3(2)^2 + 12(2) - 8 = -12 + 24 - 8 = 4$
(2, 4)

8. Find the vertex of $y = \frac{2}{3}(x-2)^2 - 4$. (2, -4)

9. List the value of a and c , and describe how each of these values transforms the graph.

$y = -5x^2 + 8$ $a = -5$ reflected over x-axis + skinny / vertical stretch
 $c = 8$ shift up 8

10. Find the solutions of $2x^2 + 9x = 18$ using the method of your choice.

$$2x^2 + 9x - 18 = 0$$

$$x = -6, 1.5$$

11. Which of the following is NOT a transformation of $y = 3(x-5)^2 + 2$

- a. Skinnier b. Shifted right c. Shifted up d. Reflected over x-axis

Key Features 1 2 3 4 5

12. Expand $(2x+3)(x-1)$ $2x^2 - 2x + 3x - 3 = 2x^2 + x - 3$

13. Factor the following completely:

a. $x^2 + 3x - 10$

$(x+5)(x-2)$

b. $4x^2 - 36$

$4(x^2 - 9)$
 $4(x-3)(x+3)$

c. $10x^2 - 4x$

$2x(5x - 2)$

d. $3x^2 + 2x - 8$

$(3x-4)(x+2)$

Factoring 1 2 3 4 5

14. $i = ?$ $\sqrt{-1}$ $i^2 = ?$ -1

15. Simplify $\sqrt{-64}$ $8i$

16. $(-2-i)(4+i)$ $-8 - 2i - 4i - i^2$
 $-8 - 6i - (-1) = -8 - 6i + 1 = -7 - 6i$

17. Solve $x^2 + 4 = 0$

$$\sqrt{x^2} = \sqrt{-4}$$

$$x = \pm 2i$$

18. Solve $(\sqrt{6-x})^2(3i)^2$

$$6-x = 9i^2$$

$$6-x = 9(-1) = -9$$

$$-x = -15$$

$$x = 15$$

Imaginary Numbers 1 2 3 4 5

Overall rating for quadratic functions 1 2 3 4 5

MATRICES

1. What size are the following matrices?

a. $\begin{bmatrix} 9 & 11 & 36 & 5 & 12 \\ 10 & 59 & 7 & 14 & 48 \end{bmatrix}$

$$2 \times 5$$

b. $\begin{bmatrix} 25 \\ 15 \\ 10 \\ 5 \end{bmatrix}$

$$4 \times 1$$

c. $\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix}$

$$3 \times 3$$

2. Write a 4x2 matrix that fits the following data for a forecast of high (H) and low (L) temperatures.

Monday 3/8	Tuesday 3/9	Wednesday 3/10	Thursday 3/11
H 39	H 42	H 43	H 40
L 24	L 29	L 28	L 27

$$\begin{matrix} H \\ T \\ W \\ R \end{matrix} \begin{bmatrix} 39 & 24 \\ 42 & 29 \\ 43 & 28 \\ 40 & 27 \end{bmatrix}$$

3. $A = \begin{bmatrix} 15 & 7 \\ -30 & 10 \\ 9 & 18 \end{bmatrix}$

$B = \begin{bmatrix} 50 & 17 \\ 10 & -20 \\ 5 & -8 \end{bmatrix}$

a. Find $A+B$

$$\begin{bmatrix} 65 & 24 \\ -20 & -10 \\ 14 & 10 \end{bmatrix}$$

b. Find $A-B$

$$\begin{bmatrix} -35 & -10 \\ -40 & 30 \\ 4 & 26 \end{bmatrix}$$

c. Find $-2B$

$$\begin{bmatrix} -100 & -34 \\ -20 & 40 \\ -10 & 16 \end{bmatrix}$$

4. Find $\begin{bmatrix} 35 & -6 \\ 15 & 20 \end{bmatrix} + \frac{1}{2} \begin{bmatrix} 16 & 4 \\ -10 & 19 \end{bmatrix}$

$$\begin{bmatrix} 35 & -6 \\ 15 & 20 \end{bmatrix} + \begin{bmatrix} 8 & 2 \\ -5 & 9.5 \end{bmatrix} = \begin{bmatrix} 43 & -4 \\ 10 & 29.5 \end{bmatrix}$$

5. Use matrices to solve the following system:

$$\begin{bmatrix} 3 & 2 & -7.5 \\ 8 & -5 & 7.3 \end{bmatrix} \xrightarrow{\text{rrrf}} \begin{bmatrix} 1 & 0 & 3.5 \\ 0 & 1 & -9 \end{bmatrix}$$

$$x = 3.5 \quad y = -9$$

$$3x + 2y = -7.5$$

$$8x - 5y = 73$$

$$-2a + 4b - 6c = -102$$

$$8a - 2b + 3c = 156$$

$$a + 6b - 5c = -53$$

$$\begin{bmatrix} -2 & 4 & -6 & -102 \\ 8 & -2 & 3 & 156 \\ 1 & 6 & -5 & -53 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 15 \\ 0 & 1 & 0 & -3 \\ 0 & 0 & 1 & 10 \end{bmatrix}$$

6. Use matrices to solve the following system:

$$a = 15 \quad b = -3 \quad c = 10$$

7. I purchased 15 tickets for a total of \$150. The student tickets cost \$7 and the adult tickets cost \$12. How many student tickets did I purchase?

$$9 \text{ adult} + 7 \text{ student tickets}$$

Overall rating for matrices 1 2 3 4 5

$$\text{total tickets: } a + s = 15$$

$$\text{total \$ } 12a + 7s = 150$$

$$\begin{bmatrix} 1 & 1 & 15 \\ 12 & 7 & 150 \end{bmatrix} \xrightarrow{\text{rrrf}} \begin{bmatrix} 1 & 0 & 9 \\ 0 & 1 & 6 \end{bmatrix}$$